

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re application of:

Helmut MANGOLD *et al.*

Application No. 10/020,920

Filed: December 19, 2001

For: PYROGENIC OXIDES DOPED  
WITH POTASSIUM

**Confirmation No. 8866**

Art Unit: 1793

Examiner: N.Y. M. NGUYEN

Atty. Docket No.: 032301.603

**AMENDED APPEAL BRIEF**

Sir:

This is an appeal to the Board of Patent Appeals and Interferences from the final rejection set forth in the Office Action of August 16, 2007. Appellants timely filed a Notice of Appeal and a Request for an Extension of Time on January 29, 2008.

Appellant submits herewith an amended Appeal Brief (original footnote 12 has been deleted) in response to Office Communication dated December 10, 2008 and a request for a one month extension of time. The Commissioner is authorized to charge the required fee to Deposit Account No. 02-4300. Should an additional fee be required other than the amounts previously paid to the U.S. P.T.O., the Commissioner is authorized to charge Deposit Account No. 02-4300 for the purposes of maintaining the pending status of this application.

**(1) REAL PARTY IN INTEREST**

The Assignee of this Application, and thus the real party of interest in this Appeal, is Evonik Degussa GmbH, having a business address at Rodenbacher Chaussee 4, 63457 Hanau Germany.

## **(2) RELATED APPEAL AND INTERFERENCES**

No appeal or interferences are known to Appellants or the Appellants' legal representative for Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

## **(3) STATUS OF CLAIMS**

The Application was filed with claims 1-5.

Claims 1-5 were amended and claims 6 and 7 added by a preliminary amendment.

Claim 1 was amended in the Amendment submitted on December 12, 2003.

A Rule 116 Amendment was submitted on June 16, 2004 and was not entered.

Claims 8-10 were added with a first Request for Continued Examination (RCE) submitted July 22, 2004.

Claim 4 was amended and claim 11 added in the Amendment submitted February 2, 2005.

Claims 1, 3 and 4 were amended and claim 8 cancelled in an Amendment submitted October 21, 2005.

Claims 1 and 4 were amended in an Amendment submitted June 14, 2006.

A Rule 116 Amendment amending claims 1, 4, 5 and 10 and cancelling claim 2 and 9 was submitted January 26, 2007 but not entered.

A second RCE was filed February 21, 2007 requesting entry of the Amendment submitted January 26, 2007.

Claims 1, 4 and 10 were amended in an Amendment submitted June 5, 2007.

Claims 1, 3-7 and 10-11 were finally rejected in the Office Action mailed August 16, 2007. These are the claims pending the application, with claims 1, 4 and 10 being the independent claims. Claims 2 and 8-9 have been cancelled.

Claims 1, 3-7 and 10-11 are appealed and set forth in the Appendix to this Appeal Brief.

#### **(4) STATUS OF AMENDMENTS**

After the final Office Action dated August 16, 2007, Appellants filed the Notice of Appeal. No amendments were filed after the final Office Action that is being appealed.

#### **(5) SUMMARY OF THE CLAIMED INVENTION<sup>1</sup>**

There are three independent claims: claims 1, 4 and 10. Claim 1 is directed to spherically shaped potassium doped pyrogenically produced metal or metalloid oxide particles having a breadth of particle size of at least 0.7. See page 2 at lines 14-15. Also see Example 7 (pp. 17-18), Table 4 (pp. 27 and 28) and Figures 11 to 13). Claims 4 and 10 are directed to two-step methods for the preparation of the product described in claim 1. See page 3 at lines 4-18. The actual steps are the same. The difference between claim 4 is open to the presence of other steps while claim 10 is closed. Claim 4 (“comprising”) requires the performance of at least the enumerated steps. Claim 10 (“consisting of”) the performance is limited to the two enumerated steps. These steps are the same.

Claim 1 further characterizes the particles as having 1) uniformly distributed potassium having a concentration from about 0.03 to 20% by weight (see page 1, lines 14-15), 2) BET

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<sup>1</sup> The instant specification discusses the unexpected nature of the morphological changes in potassium doped pyrogenically produced silica particles first seen at a minimum potassium concentration. The morphological change in particle concentration permits one to achieve the claimed narrow particle size distribution in a two step process without the need of filtration. Such a narrow distribution of particle sizes was not recognized for potassium doped pyrogenically produced silica prior to Appellants’ work.

surface between 1 and 1000 m<sup>2</sup>/g (see page 2 at line 3) and 3) a pH of more than 5, when the particles were present in a four percent dispersion (see page 2, line 17).<sup>2</sup>

Claim 4 describes a two step process. The first step is the feeding of an aerosol-gaseous mixture into a flame under conditions suitable for producing pyrogenic oxides by flame oxidation or flame hydrolysis to form the potassium-doped pyrogenic oxide spherical particle product having a distribution of particle size of at least 0.7. The second step is the direct recovery of the identified pyrogenic-doped oxide product directly from the reacted aerosol-gaseous mixture. Claim 4 specifies the use of an aerosol with a concentration of a potassium salt of more than 0.5% by wt. (See, for example, page 3 of the specification at lines 4-18).<sup>3</sup> The process is exemplified in Examples 2-7. See Table 1 for conditions. See Table 2 for the recovered product characteristics. Claim 4 permits the presence of other steps due to its use of “comprising.”

Claim 10 describes a process similar to that of claim 4. Support for the process is the same as that set forth for claim 4 above. Claim 10 employs the closed transition phrase “consisting of” in the contrast to claim 4 which employs the open transition phrase “comprising”. Therefore, claim 10 is limited to the two enumerated steps.

#### **(6) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

The grounds of rejection for review are as follows:

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<sup>2</sup> The product is suitable for chemical mechanical polishing (CMP) applications. (See, for example, page 4 of the specification in the paragraph starting at line 17.)

<sup>3</sup> The morphology changes and narrow distribution of particles are apparent from Figures 11A-13B (Table 4 and Example 7 (20% potassium dopant)). Figures 8A-10B (Table 3 and Example 1) illustrate the results obtained in the absence of a dopant.

A. Whether claims 1-7 and 9-11 are properly rejected under 35 U.S.C. § 103(a) as being unpatentable over CA 2,223,377 (Mangold et al.) taken in view of Vanell (US 6,423,638) or Hall et al. (US 6,372,648)?

## **(7) ARGUMENT**

A. Whether claims 1-7 and 9-11 are properly rejected under 35 U.S.C. § 103(a) as being unpatentable over CA 2,223,377 (Mangold et al.) taken in view of Vanell (US 6,423,638) or Hall et al. (US 6,372,648)?

### **1. Argument for method claim 10**

CA 2,223,377 does not teach or suggest a two step method where an aerosol formed from an aqueous solution having a potassium salt concentration of more than five percent by weight is used in a first step to produce potassium doped by pyrogenically produced metal or metalloid oxide particle producing having a breadth of distribution of particle sizes of at least 0.7 which product is directly recovered from the gaseous reaction mixture, formed in the first step, in the second step.

Claim 10 method is limited to the two recited steps since it employs "consisting of" as the word of transition.<sup>4</sup> The claimed aerosol has a potassium salt concentration greater than 0.5% by weight. The claimed product comprising pyrogenic-doped oxide particles having a breadth of particle distribution of at least 0.7 is recovered directly from the reacted aerosol aerosol-gaseous mixture.

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<sup>4</sup> See MPEP 2111.03 and cases cited therein. The transition word "consisting of" excludes any element, step or ingredient not specified in the claim. *In re Gray*, 53 F.2d 520, 11 USPQ 255 (CCPA 1931).

In contrast to the claimed method, CA 2,223,337 (Mangold et al.) teach a process for preparing doped, pyrogenically produced metals and/or metalloid oxide particles using flame hydrolysis techniques. No range of potassium salts is expressly taught and no purpose, other than doping is taught for the dopant material. Various uses of the doped pyrogenically produced metal and/or non-metal oxide are listed. Included in the list is CMP applications. Doping with cerium and potassium are exemplified. Example 5 is the only teaching dealing with potassium salt amounts, which amount is limited to 0.5% by weight.<sup>5</sup> The recovered product is not characterized in terms of particle size distribution. The product is described as a white, finely divided powder.

The experimental conditions mentioned in Example 5 of CA 2,223,337 differ from those described in the instant specification, e.g. additional oxygen.<sup>6</sup> The characteristics of the recovered product of the reference also differs from that recovered by Appellants.<sup>7</sup> These differences in product characteristics and experimental conditions, together, suggest the process as claimed is distinct from CA 2,223,337.

It is clear that CA2,223,337 does not teach the process as claimed. The Examiner also recognizes this since the rejection based on anticipation by the "primary" reference was withdrawn.<sup>8</sup>

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<sup>5</sup> Please note that the claims exclude this amount and that the instant examples specify higher concentrations.

<sup>6</sup> Table 1 of the reference and Table 1 of the instant specifications (p. 20) set forth experimental conditions. Only the SiCl<sub>4</sub> amounts are clearly the same. The others clearly differ in amounts, e.g. Primary, or are not mentioned at all, e.g. additional oxygen.

<sup>7</sup> Table 2 of the reference and Table 2 in the specifications (p. 21) describe the characteristics of the recover product. Some characteristics are mentioned in both tables. Some characteristics, e.g. bulk density, DBP stamping density are mentioned only in the instant specification. The common characteristics clearly differ, e.g. BET, 199 v. 104, pH, 4.83 v 7.96. These product characteristic differences further suggest the differences in experimental conditions result in product differences.

<sup>8</sup> The anticipation rejection based on the Canadian patent was withdrawn in the Office Action dated March 18, 2004. See page 3.

The applied references do not disclose, individually or collectively, a result-effective variable which has been deemed obvious to optimize and would arrive at the claimed potassium salt concentration and the recovered product.<sup>9</sup>

CA 2,223,337 does not identify a correlation of the breadth of doped particle distribution with dopant concentration, in particular potassium salt concentration. There is no mention of a range of potassium salt concentrations. There is a range of concentrations for dopants. There is no teaching within CA 2,223,337 that correlates dopant concentrations, especially potassium salts, with obtaining a narrow range of particle size distribution.<sup>10</sup> It is not seen how it would have been obvious to arrive at the process as described by claim 10 by routine trial and error experimentation without a disclosure of potassium salt concentration as a result-effective variable. Further, the claim requires both that the amount of potassium salt be greater than 0.5% by weight and also that the resultant product having the claimed particle size distribution be directly recovered from the gaseous reaction mixture. There is no size based screening methodology. A cyclone or simple filter is used.

The secondary references, discussed below, are not directed to the manufacture of potassium doped pyrogenically produced metal or metalloid oxide particles. There is no mention of potassium salts in the context of being a result-effective variable relative to any property that would have led to the claimed potassium salt concentration.

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<sup>9</sup> A particular parameter must first be recognized as a result-effective variable before a determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F2d. 618, 195 USPQ 6 (CCPA 1977).

<sup>10</sup> No rationale has been provided as to how optimization of the dopant concentration would lead to the claimed potassium salt concentration and the recovery of doped metal or metalloid oxide particles having the narrow claimed breadth of distribution of particle size distribution of at least 0.7 particle. The method of Claim 10 clearly does this in only two steps. There is no ornate filtration/screening process.

The claim requires the recovery of a specified product; knowledge of the existence of that product would have been required so that it would have been obvious to recover. There is no disclosure of the product other than in the instant specification.

The CA 2,223, 337 in Example 5 teaches the recovery of its product by a filter or cyclone. This mode of recovery is disclosed by Appellants in the specification. The experimental conditions, however, would have to be the same or similar to those employed by Appellants for the claimed product to be inherently recovered. This does not appear to be the case. The Appellants' experimental conditions are distinct from those taught in Example 5 of CA 2,223,337. See footnote 6. It would be speculative to assume that the claimed product would be inherently recovered since the experimental conditions are different and result in different product characteristics. See footnote 7. The Examiner no longer relies on anticipation so apparently he agrees that the conditions are different. See footnote 8. Any reliance on Appellants' disclosure would involve the use of impermissible hindsight.

The secondary references fail to remedy the deficiencies of the primary reference since they contain no teaching of potassium salts as a result-effective variable, which if optimized, would lead to the claimed potassium salt concentration.

Vanell (US 6,423,638) does not provide a teaching of a result-effective variable, which if optimized would result in the claimed concentration and the claimed process described by claim 10. The Vanell teaching is not directed to the manufacture of doped particles but rather is concerned with a storage problem associated with "down stream" use of dispersions of colloidal silica. Vanell teaches a "non-plugging" filter design for removing agglomerated or aggregated colloidal silica particles from a dispersion. The filtered dispersion of colloidal silica is used for



planarizing semiconductor wafers at site of operation.<sup>11</sup> The presence of larger particles in the colloidal silica dispersions lead to the "scratching" of wafers in CMP applications. The use of Vanell filters at the CMP site removes the larger particles prior to use.

Vanell does indicate that ideally a polishing slurry would comprise abrasive particles having a size distribution in a narrow range. There is no mention of how one can achieve this starting with a gaseous reaction mixture like that taught in the CA 2,223,337 manufacturing process. Mere mention of the desirability of monodispersions (a breadth of distribution of particle size of 1) in the context of CMP applications does not provide the necessary guidance which would have allowed one to obtain a product like that claimed directly from a gaseous reactions mixtures in two steps like that claimed.

Hall et al. (US 6,372,648) does not provide a teaching of a result-effective variable, which if optimized, would result in the claimed concentration and the recovery of the claimed product. Hall et al. is not directed to a manufacturing process involving doped by pyrogenic particles. Rather, Hall et al. teach a chemical mechanical polishing slurry with functionalized silica abrasive particles.<sup>12</sup> The functionalization permits use of the silanized silica particles at high pH values where silica particles normally degrade.

There is no mention in Hall et al. of potassium or potassium salt concentrations as a factor in controlling the breadth of particle size distributions in such manufacturing processes.

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<sup>11</sup> Vanell is concerned with the development of a filter capable of use with a colloidal suspension in real-time. Vanell achieves this, in part, by breaking apart agglomerates prior to filtering. See col. 4, lines 43-52. The materials mentioned by Vanell as applicable for their approach are silicon dioxide particles formed either by chemical vapor deposition of  $\text{SiCl}_4$  or by colloidal methods. These particles form aggregates having sizes of at least 150 nanometers. See col. 15, lines 45-59. Vanell clearly states that 1) the well known processes of filtering are inadequate for filtering colloidal suspensions because of high particle counts in suspension, 2) filters rapidly blind suspension making it unstable for the application. See col. 19, lines 38-44.

<sup>12</sup> Hall et al is concerned with functionalized oxides (chemically treated oxides) in the context of abrasives to be used in CMP. The functionalization imparts stability to the particles in alkaline environments by preventing degradation.

Mere mention of the desirability of monodispersions in the context of CMP applications does not provide the necessary guidance which would have allowed one to obtain a product like that claimed directly from a gaseous reaction mixtures in a two step process like that claimed.

The secondary references do not suggest their combinability with the primary reference.<sup>13</sup>

While the primary and secondary references mention CMP applications, there is no apparent problem existing in the primary reference for which the Vanell filter or the Hall et al silanization process would be sought as a solution. The silica types in Vanell are not pyrogenically produced nor are they potassium doped pyrogenically produced silica particles. CA 2,223,337 does not mention the presence of large particles produced by agglomeration or aggregation or conditions which would result in their production. The Vanell filter is directed to the filtration of stored aqueous dispersions which required filtration prior to use on site in a CMP process on site. Further, the inclusion of such a filtration step would be precluded by "consisting of." Examiner has not provided a satisfactory explanation or citation as to why the closed nature of "consisting of" can be ignored. Claim 10 is limited to two steps and recovers a desired product suitable for CMP use.

Hall et al. is directed to silanization of silica to impart stability at alkaline pH. The Examiner has not provided a satisfactory explanation or a citation as to why one would ignore the closed nature "consisting of" as a word of transition. Claim 10, as written, would preclude a silanization step.

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<sup>13</sup> When prior art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself...Something in the prior art as a whole must suggest the desirability, and thus the obviousness of making the combination." Uniroyal, Inc. v. Rudkin-Wiley, Corp., 837 F. 2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir. 1988).

The Vanell reference directed to dispersions containing precipitated silica does not provide sufficient guidance as to how to adapt its teaching to potassium doped pyrogenically produced silica recovered from a gaseous phase.

Examiner suggests any particle size range present in the Example 5 product of CA 2,223,337, whether narrow or wide, needs attention and can be further narrowed by filtration. Note Vanell teaches that there are downsides to filtration. See background section and col. 19 lines 32-49. Only colloidal products are exemplified by Vanell. No specific detailed guidance exists as to pyrogenic silica. There is unpredictability as to actual benefits to be obtained. A dispersion of pyrogenic silica would be expected to gel over time unless properly treated. A highly viscous liquid would not be amenable to filtration where ease of flow is required. There is no teaching cited by the Examiner as to how address the viscosity issue.

## **2. Argument for method claims 4, 6-7 and 11<sup>14</sup>**

The process described in claim 4 is similar to claim 10 except that claim 10 employs "comprising" as a word of transition and therefore is open to the presence of additional steps.

Claims 4, like claim 10, requires the presence of a potassium salt concentration more than 0.5% by wt. and requires the recovery of potassium doped by pyrogenically produced silica particles having the claimed narrow range of particle sizes and also having the specified concentration of potassium distributed equally within the particles.<sup>15</sup>

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<sup>14</sup> Claims 6-7 and 11 depend on claim 4. These claims are not separately argued.

<sup>15</sup> The instant specifications discusses the unexpected nature of the morphological changes in potassium doped pyrogenically produced silica particle first seen at a minimum potassium concentration. The morphological change in particle concentration permits one to achieve the claimed narrow particle size distribution in a two step process without the need of filtration. Such a narrow distribution of particle sizes was not recognized for potassium doped pyrogenically produced silica prior to Applicants' work.

The arguments presented above relative to potassium salt concentration and the recovery of potassium doped pyrogenically produced metal or metalloid oxide particles having a breadth of distribution of particle size of at least 0.7 are equally applicable here. The closed nature or open nature of the transition would not impact the arguments.

### **3. Argument for product claims 1-3**

Claim 1, a product by process claim, is directed to potassium doped pyrogenically produced metal or metalloid, e.g. silica, particles having 0.03 to 20% by weight potassium uniformly distributed within the particle size of at least 0.7. (One represents a monodispersion.) Claim 3 further limits the product defined in claim 5 by the DBP values which correspond to minimum structure (Figure 4).

The primary reference does not reasonably teach the product or render it obvious.

It is not seen that CA 2,223,377 fairly teaches, suggests or renders obvious the product claimed. There is no mention in CA 2,223,377 of a particle size distribution liked that claimed. There are differences in the preparatory methods, e.g. concentration of the potassium salt. See footnote 6. There are also clear differences in the measured and comparable product characteristics. See footnote 7.

The secondary references provide no guidance as to how the CA product could be modified to arrive at the product claimed.

The teachings of Vanell and Hall et al are discussed above. Both references teach the desirability of "monodispersions" in CMP processes. Neither secondary reference teaches how to get there starting with potassium doped pyrogenically produced metal or metalloid oxide particles. Further, neither secondary reference provides a teaching which would suggest that the

claimed product is inherently recovered in Example 5 of the Canadian Patent. Appellants produce the claimed product from a gaseous reaction mixture in two steps.

### **The Examiner's Position**

According to the final Office Action dated August 16, 2007, the Examiner asserts the subject matter as a whole is obvious since it would have been obvious to select the portion of the prior art's range which is within the Applicants' range because it has been held prima facie obvious to select a value in a known range by optimization for results.<sup>16</sup> Appellants disagree for the reasons stated above including: A potassium salt range is not taught by the references. There is no teaching of a result dependent variable that depends on potassium salt concentration. There is no teaching in the references that a dopant concentration affects the range of particle size distribution.

Further, the Examiner asserts that the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because overlapping ranges have been held to be prima facie obvious.<sup>17</sup> Appellant disagrees for the reasons set forth above which include: The Examiner admits that CA 2,223,377 does not disclose specifically the distribution of particle size, the pH or the absorption of dibutylphthalate of the oxide product (claim 3). The Examiner urges that if the CA 2,223,377 product does not inherently possess these characteristics (the anticipation rejection was dropped), it would be obvious to subject the

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<sup>16</sup> In re Boesch, 617 F.2d 272, 205 USPQ 215 (Fed. Cir. 1988). There is no range of potassium salts expressly taught in the reference. There is no function for potassium salt concentration taught in the reference, which if optimized would have resulted in the claimed concentration. The case does not suggest that one can optimize in a vacuum. One must know that there is a correlation between a variable and property one wishes to optimize. Here, there is not even a stated reason to select potassium salt concentration or the potassium concentration for optimization amongst other possible parameters.

<sup>17</sup> In re Malagari, 499 F.2d 1297, 182 USPQ 549 (CCPA 1974). There is no overlapping range of potassium salt concentrations. The case does not suggest that one can optimize in a vacuum. One must know that there is a correlation between a variable and a property one wishes to optimize. Here, there is no stated reason to select potassium salt concentration or the potassium concentration for optimization amongst other possible variables.

product to a screening process to obtain a monodispersed product since the desire to obtain a monodispersed product is well known in the art (Vanell (column 2 at lines 47-50)), Hall et al. (paragraph bridging columns 1-2)). Appellant again disagrees for the reasons argued above including there is no teaching in any of the references as to how this can be achieved for potassium doped silica.

The Examiner agrees that claim 10 includes "consisting of" as a transition phrase but asserts that its significance can be ignored since there is insufficient evidence to show that the narrow particle size cannot be obtained through mere trial and error experimentation.

The Examiner asserts that it would have been obvious to employ the Vanell filtration method to optimize the particle distribution range of CA 2,223,337 product, e.g. narrow the particle size distribution.

#### **(8) CONCLUSION**

For the foregoing reasons, it is respectfully submitted that claims 1-7 and 9-11 are patentable over CA 2,223,377 taken in view of Vanell (6,423,638) or Hall et al. (US 6,372,648). Accordingly, the Examiner's rejection of these claims should be reversed.

Respectfully submitted,  
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## **(9) CLAIM APPENDIX**

### **Listing Of Claims:**

Claim 1 (Previously presented): Spherically shaped potassium doped pyrogenically produced metal or metalloid oxide particles having a breadth of distribution of particle size of at least 0.7 and having uniformly distributed potassium from about 0.03% to 20% by weight and which are doped by means of aerosol with a potassium salt solution, characterized in that the spherically shaped pyrogenically produced particle base component is produced by flame oxidation or flame hydrolysis and wherein the doped oxide particles have a BET surface between 1 and 1000 m<sup>2</sup>/g, and wherein the pH of a 4% aqueous dispersion of the doped particles is more than 5.

Claim 2 (Cancelled)

Claim 3 (Previously presented): The pyrogenically produced oxides of metals or metalloids in accordance with claim 1, further characterized in the absorption of dibutylphthalate does not allow any end point to be recognized.

Claim 4 (Previously presented): A method of producing potassium-doped pyrogenic oxide spherical particles having a uniformly distributed potassium content of more than about 0.03% by weight and having a breadth of the distribution of particle size of at least 0.7 comprising,

A) sequentially feeding a gaseous mixture, including a pyrogenic oxide precursor, and an aerosol to form an aerosol-gaseous mixture, which is fed into a flame under conditions suitable for producing pyrogenic oxides by flame oxidation or flame hydrolysis from the precursor, to form the potassium-doped pyrogenic oxide spherical particles having a uniformly distributed potassium content of more than 0.03% by weight, and

B) recovering the formed pyrogenic-doped oxide spherical particles, which have BET surface of the doped oxide is between 1 and 1000 m<sup>2</sup>/g and the breadth of distribution of particle size of at least 0.7, from the reacted aerosol-gaseous mixture,

wherein the aerosol is homogeneously mixed before the reaction with the gaseous mixture and is prepared from a potassium chloride salt solution having a concentration of more than 0.5% by wt.

Claim 5 (Previously presented) A composition comprising the doped pyrogenic oxides of claim 1.

Claim 6 (Previously presented): The method of claim 4 wherein the aerosol is produced by atomization by means of an aerosol generator.

Claim 7 (Previously presented): The method of claim 6 wherein the atomization involves a gas-atomizing (two-fluid) nozzle method.

Claims 8 and 9 (Canceled)

Claim 10 (Previously presented): A method of producing potassium-doped pyrogenic oxide spherical particles with a breadth of the distribution of particle size of at least 0.7 and a uniformly distributed potassium content of more than about 0.03% by weight consisting of,

A) sequentially feeding a gaseous mixture, including a pyrogenic oxide precursor, and an aerosol to form an aerosol-gaseous mixture, which is fed into a flame under conditions suitable for producing pyrogenic oxides by flame oxidation or flame hydrolysis from the precursor, to form the potassium-doped pyrogenic oxide spherical particles having a uniformly distributed potassium content of more than 0.03% by weight, and



B) recovering the formed pyrogenic-doped oxide spherical particles, which have BET surface of the doped oxide particles is between 1 and 1000 m<sup>2</sup>/g and have a breadth of the distribution of particle size of at least 0.7, from the reacted aerosol-gaseous mixture,

wherein the aerosol is homogeneously mixed before the reaction with the gaseous mixture and is prepared from a potassium salt solution having a concentration of more than 0.5% by wt.

Claim 11 (Previously presented) The method of claim 4 further comprising adding oxygen prior to the separation step.

**(10) EVIDENCE APPENDIX**

None

**(11) RELATED PROCEEDINGS APPENDIX**

None

SGRDC325721.1